

Spot Safety Project Evaluation

Project Log # 200501248

Spot Safety Project # 06-97-203

**Spot Safety Project Evaluation, of the Flashing Traffic Signal Installation,
At the Intersection of NC 55 and SR 1532-Oak Grove Church Road / SR 1544-Guy Road,
Harnett County**

Documents Prepared By:

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08/26/2005

Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-97-203 – The Intersection of NC 55 and SR 1532-Oak Grove Church Road / SR 1544-Guy Road, Harnett County

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naïve before and after analysis and an Odds Ratio comparison analysis has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an overhead flashing traffic signal. J.M. Lynch, P.E., State Traffic Engineer, originally requested the improvement in reaction to a fatal crash. NC 55, SR 1532-Oak Grove Church Road, and SR 1544-Guy Road are two-lane facilities at the treatment intersection. The posted speed limit is 55 mph on all approaches. Intersection warning signs with 45 mph advisory speed plaques are located on both NC 55 approaches. The subject location is controlled by stop signs on SR 1532-Oak Grove Church Rd and SR 1544-Guy Road. SR 1532 is frequently used as a short cut route to Campbell University, which adds to the traffic volume and accident potential at the intersection.

The initial crash analysis for this location was completed from January 1, 1988 through September 30, 1997 with a total of 22 reported crashes. According to the initial crash analyses, there were 16 Angle crashes, three Left-Turn crashes, one Right-Turn crash, one Rear-End crash, and one Ran Off Road crash, resulting in two fatalities, 11 class A injuries, 14 class B injuries, and 18 class C injuries. Angle crashes have occurred at the intersection over the past ten years, as a result of motorists failing to perceive the stop condition on SR 1532-Oak Grove Church Rd and SR 1544-Guy Road. Investigation of the (November 1, 1996) accident that resulted in two fatalities determined that vehicles parked along the shoulder of SR 1532 may have prohibited the motorist's line of sight to the stop sign and contributed to their failure to stop. As a result of this crash, "No Parking" signs were posted on the northbound shoulder of SR 1532. An additional Angle crash occurred on December 3, 1997, resulting in two fatalities and several other injuries. The motorist, who was under the influence of alcohol, failed to stop and collided with a motorist travelling south on NC 55. The crash caused a chain reaction, which involved two other vehicles. The final completion date for the improvement at the subject intersection was on June 23, 1998.

Comparison Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from May 1, 1998 through August 31, 1998. The before period consisted of reported crashes from June 1, 1992 through April 30, 1998 (5 Years, 11 Months) and the after period consisted of reported crashes from September 1, 1998 through July 31, 2004 (5 Years, 11 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet of the intersections of NC 55 at SR 2007-Clayhole Rd / SR 1723-Turlington Rd and NC 55 at SR 2009-Prospect Church Rd / SR 1725-Ashe Rd. Please see attached *Location Map* for further detail.

The following data table depicts the Naive Before and After Analysis for the treatment and comparison intersections. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	15	9	- 40.0
Total Severity Index	25.16	3.47	- 86.2
Frontal Impact Crashes	14	7	- 50.0
Frontal Severity Index	21.47	4.17	- 80.6
Volume	6600	7700	16.7

Comparison Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	23	19	- 17.4
Total Severity Index	15.39	4.51	- 70.7
Frontal Impact Crashes	17	14	- 17.6
Frontal Severity Index	19.16	5.76	- 69.9
Volume	5200	6100	17.3

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	15	9	---
Comparison Total Crashes	23	19	- 27.4 %
Treatment Frontal Impact Crashes	14	7	---
Comparison Frontal Impact Crashes	17	14	- 39.3 %

The naive before and after analysis at the treatment location resulted in a 40.0 percent decrease in Total Crashes, an 86.2 percent decrease in the Total Severity Index, and a 16.7 percent increase in Average Daily Traffic (ADT). The comparison locations experienced a 17.4 percent decrease in Total Crashes, a 70.7 percent decrease in the Total Severity Index, and a 17.3 percent increase in ADT. The before period ADT year was 1995 and the after period ADT year was 2001.

The Odds Ratio is used as another means of calculating the treatment effect. The number of crashes in the before and after period from the Comparison Intersections are used to calculate the percent reduction in crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 27.4 percent decrease in Total Treatment Intersection crashes and a 39.3 percent decrease in Frontal Impact Treatment Intersection crashes.

Results and Discussion

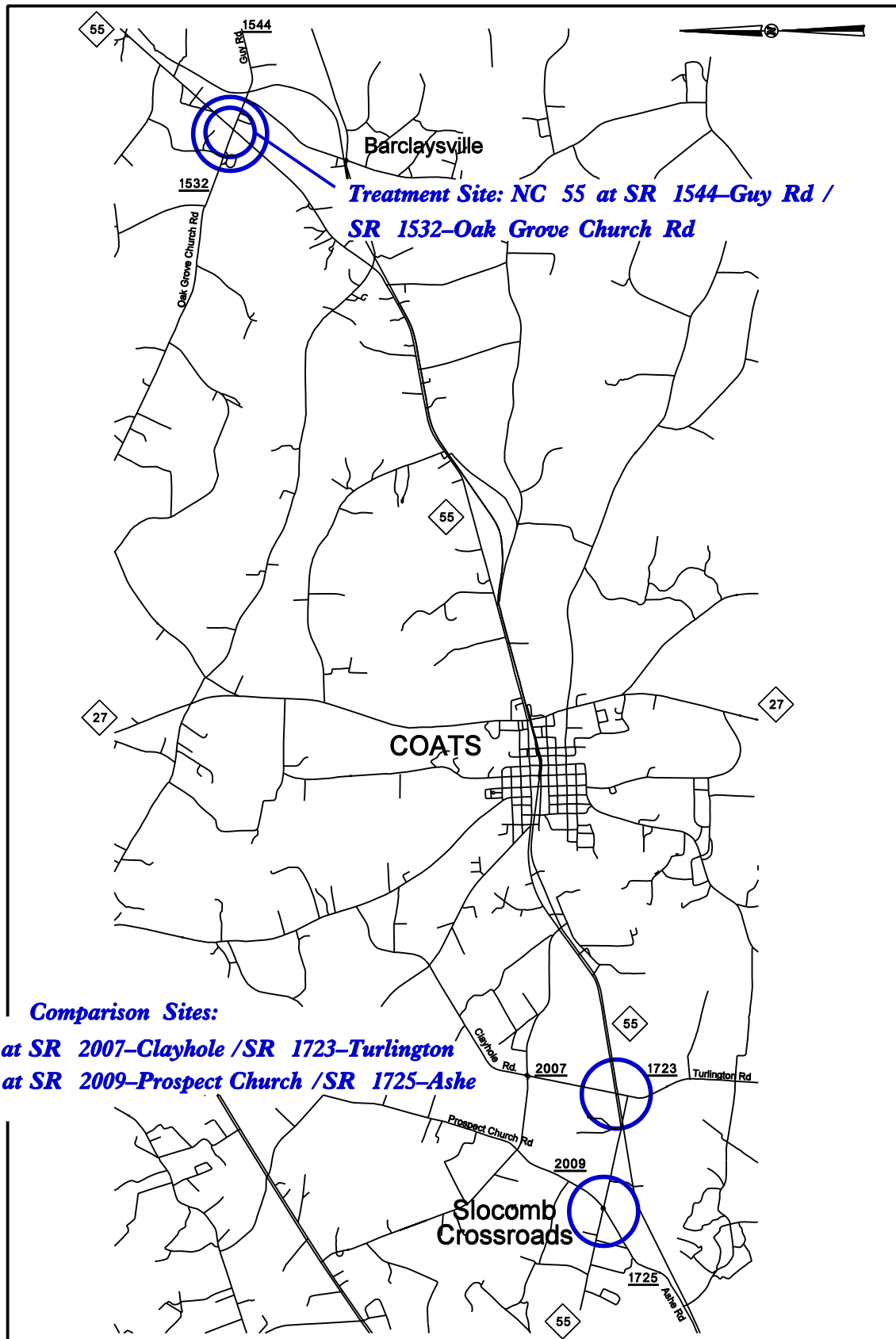
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 40.0 percent decrease in Total Crashes and a 50.0 percent decrease in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 27.4 percent decrease in Total Crashes and a 39.3 percent decrease in Frontal Impact Crashes at the Treatment Intersection. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of crashes from the before to the after period using both analysis methods. Also note that the crash severity decreased dramatically (86.2 percent for Total Crashes and 80.6 percent for Frontal Impact Crashes) from the before to the after period.

Please see the attached Treatment Site Photos. Photos are provided for each leg of the intersection. In addition, photos are included that identify the "No Parking" signs adjacent to the wrecker service, which is located in the southeast quadrant of the intersection. Also, photos are provided which show the Intersection Ahead warning signs on NC 55 and the Stop Ahead warning sign on SR 1532-Oak Grove Church Road. Please note that no Stop Ahead warning sign is currently provided on the southbound SR 1544-Guy Road approach. Also, there are no stop bars located on either of the stop-controlled approaches.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 27.4 percent decrease to a 40.0 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of a 39.3 percent decrease to a 50.0 percent decrease in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

Evaluation of Spot Safety Project Number 06-97-203

Location Map, Harnett County



Treatment Site Photos (Taken on February 25, 2005)



Looking north on SR 1532-Oak Grove Church Road



Looking south on SR 1544-Guy Road
Notice the absence of stop bars on both approaches.

Treatment Site Photos (Taken on February 25, 2005)



Looking west on NC 55



Looking east on NC 55

Treatment Site Photos (Taken on February 25, 2005)



Both photos taken while travelling northbound on the SR 1532 approach. Notice the wrecker service in the southeast quadrant of the intersection. Also note the “No Parking” signs located on the shoulder.

Treatment Site Photo (Taken on February 25, 2005)



Driving west on NC 55 toward the intersection. Notice the Intersection Ahead sign.



Driving east on NC 55 toward the intersection. Notice the Intersection Ahead sign.



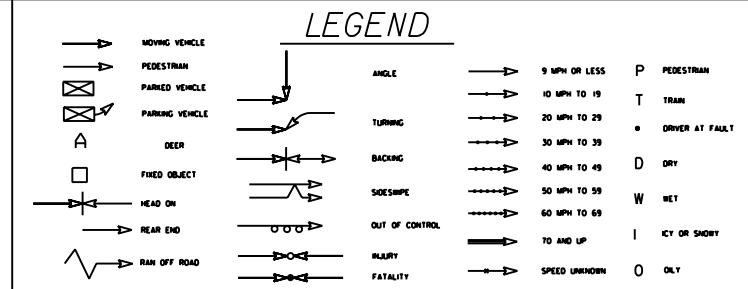
Driving north on SR 1532-Oak Grove Church Rd toward the intersection. Notice the Stop Ahead sign.



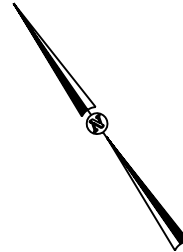
Driving south on SR 1544-Guy Rd toward the intersection. No Stop Ahead warning sign is provided.

SS 06-97-203
Treatment Site - TotalCrashes
Before Period
6/1/1992 - 4/30/1998
(5 years, 11 months)

SR 1544 - Guy Road



CHURCH



NC 55

Vehicle Lost Control Due
To Previous Accident

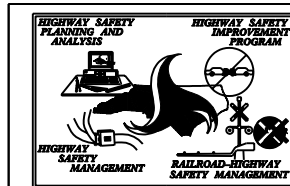
WRECKER SERVICE



TRAILER PARK

SR 1532 - Oak Grove Church Road

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



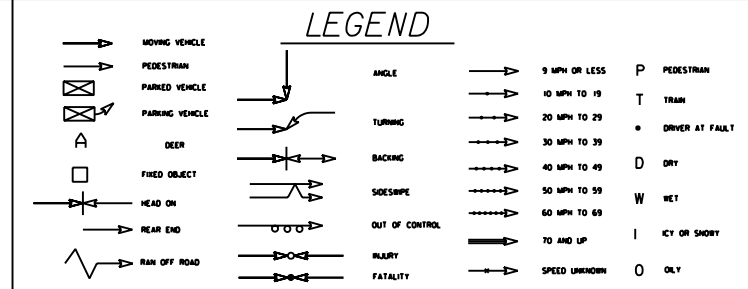
COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 06/01/1992 - 04/30/1998	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: 3/1/2005	
LOG NUMBER: 20050248	

SS 06-97-203 Before

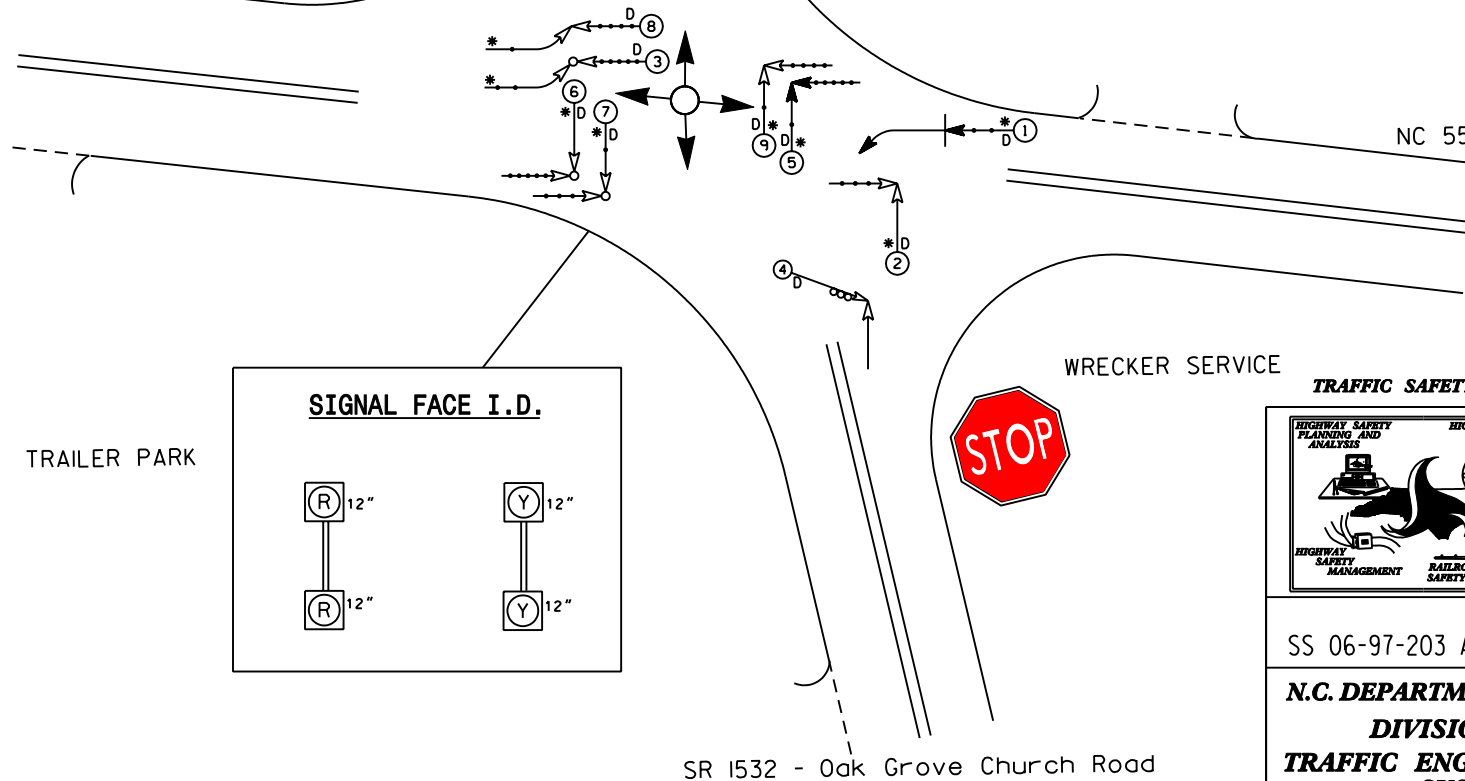
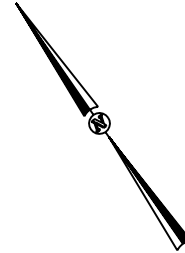
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH

SS 06-97-203
Treatment Site - TotalCrashes
After Period
9/1/1998 - 7/31/1994
(5 years, 11 months)

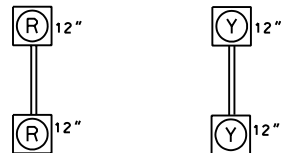
SR 1544 - Guy Road



CHURCH



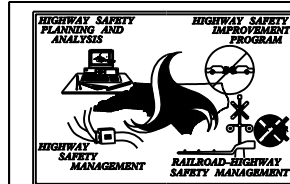
SIGNAL FACE I.D.



TRAILER PARK

WRECKER SERVICE

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 09/01/1998 - 07/31/2004	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: 3/1/2005	
LOG NUMBER: 20050248	

SS 06-97-203 After

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH